AMERICAN MUSEUM NOVITATES

Number 624 | Published by THE AMERICAN MUSEUM OF NATURAL HISTORY NEW YORK CITY | May 25, 1933

59.57, 99 A (801)

SOME NEOTROPICAL ANTHIDIINAE: *ANTHIDIUM*, *HETERANTHIDIUM*, AND *DIANTHIDIUM*

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The following report is based in part on specimens in the American Museum, in part on material kindly loaned by the British Museum and by the U. S. National Museum.

Professor T. D. A. Cockerell's aid was kindly given in connection with the interpretation of one of the species (see p. 20).

Anthidium aztecum Cresson

One female (British Museum) collected at Tepetiapa, Guerrero, Mexico, at an elevation of 3000 feet, by H. H. Smith, in June.

Anthidium chilense Spinola

One female (National Museum) collected at Maipu, Chili, Feb. 2, 1906 (F. V. Ibarro).

Anthidium chubuti Cockerell

One female and one male (British Museum) and one female (American Museum) collected at V. del Lago Xanco, Chubut, Patagonia.

Anthidium deceptum Smith

One male (British Museum) collected at Arequipa, Peru.

Anthidium maculosum Cresson

One female (British Museum) from Mexico.

Anthidium porterae Cockerell

One female (British Museum) and one female (American Museum) collected at Ventanas, Mexico, at an elevation of 2000 feet, by Forrer. (See key supplied in connection with *Anthidium quetzalcoatli*.)

Anthidium 22-punctatum Friese

One female (National Museum) collected at Guayaquil, Ecuador.

Anthidium quetzalcoatli, new species

FEMALE.—Head black with the following maculations: mandibles on their exposed surface except for the multidentate black apical edge; two large subtriangular spots on the clypeus, each almost subequal to the median triangle of black that separates them; the space between the clypeus and the inner orbit of the eyes to the level of the base of the antennae; a spot near the apex of the scape; two somewhat diamond-shaped stripes above the eyes with their pointed inner ends almost uniting. The apex of the clypeus is for the most part narrowly black, shiny, not reflexed, virtually without irregularities in its contour, gradually and very shallowly emarginate along most of its extent, and flanked at each lateral extremity by a brownish semitransparency. Except for this impunctate rim, the clypeus is rather coarsely punctured, with narrow, shiny interspaces between the punctures. The front, vertex, sides of face, and cheeks with a dense punctation that gives these areas a rather dull appearance.

The thorax with a similarly dense punctation on the mesonotum, scutellum, and mesopleura. There are heavy, yellow, L-shaped stripes bordering the mesonotum, the shorter arm of the L being along the anterior margin. The axillae and scutellum with a very broad, posterior, yellow border that has a waistlike narrowing at the middle of the scutellum, the scutellum being rather strongly emarginate at this point. The propodeum rather dull, microscopically tessellate over its entire surface, with a superimposed basal band of punctures and a punctated area some distance to each side of the apical part of the enclosure.

The legs black but with a broad, yellow stripe on the external surface of the front and middle tibiae that extends nearly from base to apex and a shorter and more attenuated stripe on the basal half of the external surface of the hind tibiae. The densely pectinate calcaria ferruginous and semitransparent.

The wings with the usual venation of *Anthidium;* hyaline, with a brown streak traversing the upper half of the marginal cell and extending into the apex of the median cell. The nervures deep brown to black.

The abdomen distinguished by a deep, constriction-like depression of the base of tergites 2–5, in addition to the flat depression of the apical region of the tergites beyond the yellow bands. The punctation in the basal region of each tergite sparser than in the equally broad apical region beyond the maculations, but even in this apical region there are interspaces between the sometimes rather chainlike groupings of punctures and the extreme apex of each tergite is smooth. The elevated region between the base and apex, which is occupied by the bands, is for the most part rather sparsely punctured like the base of each tergite. The apex of tergite 6 with a tooth on each side, succeeded by other rather irregular and still smaller denticles that give the border a somewhat rough contour. The band on tergite 1 is divided into four spots,—the outer ones very large, the inner ones smaller and rather cuneiform. The band on tergite 2 has a median interruption that is narrower than the space separating the inner maculations on tergite 1, the two halves of the band gradually narrowing to a point at their inner extremities and being abruptly, narrowly but deeply emarginate above at the middle of each. The two halves of the band on tergite 3 rather similar in shape to the maculations on tergite 2 but barely separated from each other and with the emarginations above lacking except for a slight sinuosity in the contour. The band on tergite 4 like that on tergite 3, but the two halves joined, with merely a

waistlike narrowing to indicate their semidetachment. The band on tergite 5 heavier but not so extensive, being flanked by black on each side, with a V-shaped, emargination above at the middle and with each of its coalescing halves strongly convex above. On tergite 6 there is a large median maculation with insloping sides.

The hair is for the most part silvery, although slightly ochraceous on the vertex and mesonotum. The hairs fringing the apex of the clypeus and the brushes on the under side of the basitarsi are golden. The thick matting of hair on the outside of the basitarsi, the scalelike patches at the apex of the hind tibiae, and the dense ventral scopa are snow-white.

The description is based on a single specimen, in the British Museum, that was obtained at R. Papagaio, State of Guerrero, Mexico, by H. H. Smith. Comparatively few members of the genus *Anthidium, s. str.*, have been recorded from Mexico and Central America, for the majority of those described as *Anthidium* belong to other divisions of the Anthidiinae (see Cockerell, 1904, Annals and Mag. Nat. Hist., (7) XIV, p. 206). The following key to the females of *Anthidium, s. str.*, from Mexico and Central America, may serve to separate the recorded species (the female of *Anthidium rodriguezi* Cockerell is unknown).

Key to Females

1.—The front with sparse, irregularly grouped, clear punctures scattered over a very finely tessellated surface. Sides of face immaculate but clypeus with two large yellow maculations. Tergites 1–5 of the abdomen each with four maculations of triangular or subtriangular shape.
maculosum (=*maculatum* Smith and *americanum* Friese).

The front very densely and rather coarsely punctured.....2.

2.—Tergites 2–5 strongly depressed basally as though constricted, the maculations on these tergites occupying an elevated region between this basal constriction and the flatly depressed apex. The femora black.....3.

Tergites 2–5 not strongly depressed basally. The middle region of each of these tergites not rising above the base and the apex. At least the middle and hind femora red above apically for a variable extent, usually about two-thirds of their length.....5.

3.—The margin of the clypeus rather smooth, virtually without irregularities in its contour, slightly emarginate, and not reflexed....*quetzalcoatli*, new species.

The margin of the clypeus very uneven, with several toothlike swellings or prominences; somewhat reflexed.....4.

4.—Tergite 6 with two large spherical maculations.....*porterae*.[1]

Tergite 6 with little or no maculation.....*maculifrons* (=*cognatum* Cresson).

5.—A band, briefly interrupted medianly, stretching across the vertex. L-shaped maculations (sometimes interrupted) on the mesonotum. The bands on tergites 2–5 uninterrupted.....*hallinani*, new species.

[1]Different as are *porterae* and *maculifrons* structurally in the male, the females are virtually identical structurally. Differences in the maculations between *porterae* and Atlantic seaboard specimens of *maculifrons* are largely bridged in Mexico and make identification of Mexican specimens of the females of these two species when unaccompanied by the males rather difficult. See Schwarz, 1928, Journal of N. Y. Entomological Society, XXXVI, pp. 369–372.

A spot behind the summit of each eye. A faint stripe on each side of the mesonotum above the tegulae. The bands on at least tergites 2 and 3 interrupted. *aztecum.*

Anthidium hallinani, new species

MALE.—Black with yellow and a few rust-red maculations. Head black with the following parts light yellow: mandibles except the three black teeth at the apex, of which the outermost and largest is suffused with red at its base; the clypeus, except for a broad triangle of black at the base and a narrow line of black or transparent red along the apex, which is straight, not excavated or depressed, along the middle; a maculation on each side of the face, filling the space between the clypeus and the eye and terminated at the level of the base of the antennae; a narrow line, very briefly interrupted in the middle, extending behind the ocelli from the summit of one of the compound eyes to the summit of the other; the scape except for a black, longitudinal line posteriorly (in one of the paratypes the yellow is suffused with ferruginous). The flagellum dark above, more or less ferruginous below, segments 3 and 4 being more extensively and conspicuously red than the other joints. The punctation, concealed or almost concealed on the front by the heavy growth of pale hair, is fine and dense on the vertex, coarser and with interspaces on the clypeus.

The mesonotum finely and densely punctate, the punctures on the scutellum barely if at all larger than those on the mesonotum, and the punctures on the mesopleura only a little larger. The propodeum tessellate-punctate along its base and sides, merely tessellate in the lower half of the enclosure. The tubercles with only a very feeble carina transversely across their summit,—in some instances even absent. The tegulae with rather fine but fairly dense punctures that are more distinct on the elevated middle portion than on the periphery. The following parts are light lemon-yellow: an L-shaped figure bordering each side of the mesonotum, the shorter arm of the L extending about one-third of the distance across the anterior margin of the mesonotum, the longer arm along the side of the mesonotum to connect with the broader band on the axillae and posterior rim of the scutellum, at the middle of which the band has a waistlike narrowing, the tubercles above and especially on their outer half, and sometimes the otherwise red tegulae in front (one of the paratypes). The summit of the tegulae a little darker red than the periphery.

The legs have the following red maculations: the apical half of the front femora within anteriorly and the apex of the front femora briefly above, the front tibiae within anteriorly, the tarsal joints beyond the front basitarsus; the middle coxae and trochanters sometimes with faint traces of red, the middle femora extensively red, especially the upper surface of these femora, where the maculation spreads broadly from the apex almost to the base of the joint, the middle tibiae within anteriorly, and the tarsal joints beyond the middle basitarsus; the hind coxae and trochanters sometimes with faint traces, the hind femora extensively red, especially on the upper surface of these femora, where, as in the middle femora, the maculation extends from the apex almost to the base of the joint, the hind tibiae sometimes with a faint suffusion of red within posteriorly, especially at the base, the tarsal joints beyond the hind basitarsus. The legs have the following yellow maculations: stripes posteriorly on the front and middle femora extending from the apex two-thirds or three-quarters of the way to the base; the outer surface of the front and middle tibiae except for a narrow rim of black posteriorly; the outer surface of the hind tibiae except for a

broad area of black anteriorly and sometimes a narrow edging of black posteriorly; the calcaria; the basitarsi of all the legs on their outer surface. The other parts are black, including the apical half of the tarsal claws.

Wings hyaline; nervures deep brown to blackish; a longitudinal streak (due to the density of the microscopic hairs) occupying the upper half of the marginal cell, and a much more vague and less pronounced deepening of tint at the apex of the median cell. Venation that of *Anthidium*.

Tergite 1 quadrimaculate, the outer maculations large and suboval, the inner ones relatively small and sublinear; the bands on tergites 2–5 uninterrupted but with a more or less waistlike contraction at their middle, that on tergite 2 being, in addition, slightly emarginate on each side below (and sometimes also on the corresponding point above) and those on tergites 4–5 and sometimes also that on tergite 3 being slightly emarginate on each side above. Tergite 6 has a large median maculation that occupies a little more than a third of the width of the tergite; above, this maculation is more or less emarginate at the middle, and below it has a very obtuse, inverted V-shape, corresponding with the boundary of the raised portion of the tergite. Tergite 7 varying from mostly black with little rust-red to almost wholly rust-red. The basal concavity smooth except for usually a few punctures near the edge and separated from the dorsal part of the first segment by a carina. The tergites punctate-tessellate, very densely and rather uniformly punctated in the region below each of the bands except for a very narrow, impunctate apical edging; in the region above the bands the punctation is sparser, especially so in the middle of this region, and the punctures are frequently of rather irregular size although on the whole rather fine. In contrast, the dark sides of tergite 6 are, like most of tergite 7, coarsely and rugosely punctured. The lateral teeth, one on each side of tergite 6, are straight and acute, and are variably black, red, or black with red tip. The pygidium terminates in a stout, blunt, smooth, median spine that is rounded above toward its apex; to each side of this spine, and narrowly separated from it is a broad, short lobe, rounded on its outer side, and slightly rounded to angulate on its inner side, but truncate on its apical edge. These lateral lobes, although on a lower plane than the central spine, extend no farther rearward than the spine itself. The last visible sternite ferruginous, with a strong, black-tipped spine at each of its lateral extremities, and an extensive, slightly swollen, impunctate area in the middle.

The hairs for the most part silvery to white, as well as ochraceous to golden. Silvery to white are the hairs of the clypeus and front, the dense lateral fringes of the scape, the hairs of the sides of the thorax, and those of the under surface of the thorax and of the venter, the hairs on the under side of the front femora, the fringes posteriorly on the front and middle tibiae and tarsi and anteriorly on the hind tibiae and hind basitarsi, the short, feathery hairs on the outer surface of the hind tibiae, which are for the most part scattered but at the apex of the joint are massed posteriorly in a dense, white patch. The hairs on the red areas of the femora seem, according to the angle at which the insect is held, now red, now gray. The hairs of the under side of the front tibiae are of a reddish gold, and golden, too, are the hairs of the under side of the tarsal joints. The hairs on the vertex and on the tergites are in the main ochraceous to golden and those on the mesonotum and scutellum are inclined also, although a little less emphatically, to assume an ochraceous hue.

Length, 10 to 11 mm.; width of thorax, 4¼ to 4¾ mm.; length of forewing, including tegula, 8¼ to 8½ mm.

FEMALE.—Similar to the male but with the following differences: mandibles multidentate as in other females of *Anthidium*. The apical margin of the clypeus slightly upthrust and faintly emarginate along the middle with two blunt, low teeth on each side of this central, toothless area; this apical margin is for the most part black and shiny. The clypeus with the black basal triangle far more extensive, its apex attaining the apex of the clypeus and dividing the yellow maculation into two large, subtriangular spots. The yellow maculation on the front of the scape terminates before the base (in the female paratype confined to a spot at the apex).

In the allotype the maculations of the thorax correspond with those of the male; in the female paratype the L-shaped bands are broken into a stripe along the side of the mesonotum and another independent stripe part way along the anterior border of the mesonotum.

The yellow stripes posteriorly on the front and middle femora confined to the apical half of the joint. The yellow stripes on the external surface of the tibiae are terminated a short distance before the apex of the joint and are narrower than in the male. The basitarsi dark but completely concealed under a thick matting of snow-white hair that is in sharp contrast to the reddish golden brushes on the under side of the joint. Only the anterior fringe on the hind tibiae comparable with the fringe in the male, the posterior fringes on the fore and middle tibiae being inconspicuous.

The inner elements of the band on tergite 1 completely, or nearly, united with the outer elements. Tergite 6 with an inconspicuous, blunt tooth on each side and without a depressed apical rim as in the male; the maculation on this tergite is centrally placed, slightly emarginate basally at its middle and convexly rounded to each side of this emargination, with its apex narrower than its base and straight, not obtusely V-shaped as it is in the male. The ventral scopa is silvery white except for a few golden to brownish hairs toward the apex of the last visible sternite.

Length, 9 mm.; width of thorax, 4 mm.; length of forewing, including tegula, 7¾ mm.

The description is based on two males and one female collected by T. Hallinan, Jan. 1, 1915, along the Culebra-Arrijan Trail, Canal Zone, on a single male collected by C. H. Curran, Feb. 4, 1929, at Corozal, Canal Zone, and on a single female obtained by Champion, at S. Geronimo, Guatemala. The holotype, allotype, and the two male paratypes are in the American Museum. The female paratype from Guatemala is in the British Museum.

This species, in the female at least, is not very far separated from Cresson's holotype of *aztecum*, the maculations of which are, however, more restricted (see key). In *aztecum* the region of the clypeus between the two lateral maculations is impunctate (punctate in *hallinani*) and the apical rim of the clypeus is truncate and toothless (slightly undulating and with two blunt teeth on each side in *hallinani*).

The contrast, however, is greater in the males. The male allotype of *A. aztecum* resembles structurally *A. maculifrons* Smith (=*A. cognatum* Cresson) and is wholly different structurally from the male of *hallinani*.

Almost certainly, I think, the male allotype of *aztecum* is incorrectly associated with the female holotype. I regard this allotype as a not very clearly separated variety of *maculifrons*, a species which is represented not only on the South Atlantic seaboard but in certain of our Western states and in Mexico (Schwarz, 1928, Journal of N. Y. Entom. Soc., XXXVI, pp. 369–372).

Anthidium hallinani is similar to *Anthidium sanguinicaudum* but is differentiated structurally in the male by the truncate apex of the lateral lobes of the pygidium and the absence of a small, downward-directed tooth at the apical extremity of the last visible sternite; and in the female by the presence of merely a small, blunt tooth on each side of tergite 6 in contrast to the sharp spine of *sanguinicaudum*. In the male of *hallinani* the apical part of the femora (particularly so in the case of the third femora) is extensively red, whereas in the males of *sanguinicaudum* these red areas are replaced by black. The female of *hallinani* has, like its male, tricolored legs with black rather predominant over either red or yellow; in contrast, the female of *sanguinicaudum* has legs that are almost wholly ferruginous variegated extensively with yellow. The male of *hallinani* has a sharply demarked, median maculation on tergite 6; the male of *sanguinicaudum* a continuous band on this tergite. Tergite 6 of the female of *hallinani* is black with a large yellow maculation; in *sanguinicaudum* females tergite 6 is almost wholly yellow.

Some of the differences between the female of *A. variegatipes* Cockerell from Bolivia (1927, Proc. U. S. Nat. Mus., LXXI, Art. 12, pp. 1–2) and *A. hallinani* are as follows:

Short lateral face marks, not reaching level of antennae. Margin of clypeus broadly yellow, semicircularly emarginate by black above. Short line at base of tibiæ, supplemented on middle and hind pair by another line farther down. Middle femora red with two black stripes. Middle of scutellum with shining surface showing between the punctures. Tegulae black, with two pale yellow spots. The band on tergite 2 medianly interrupted. Tergite 6 with two large transverse patches. Venter of abdomen largely red.....*variegatipes.*

Face marks reaching base of antennae. Clypeus bimaculate. The stripes on the tibiae running from the base nearly to the apex. Middle femora with basal one-third above and basal two-thirds below black, with apical two-thirds above and apical one-third below red, and with a yellow stripe posteriorly on the apical half. Middle of scutellum without a shining surface showing between the punctures. Tegulae red. Band on tergite 2, like those on 3–5, medianly uninterrupted. Tergite 6 with a large maculation that occupies most of the tergite. First sternite of abdomen with more or less red; remaining sternites largely or wholly black. *hallinani.*

The male of *variegatipes* has not yet been recorded.

Anthidium sanguinicaudum, new species

MALE.—Black, with for the most part yellow, and some rust-red maculations. The head densely, finely, and rather evenly punctured, with a faint, median, longitudinal carina down the basal half of the clypeus. The apex of the clypeus straight, not emarginate or dimpled at the middle, with semitransparent, brownish border that is thickened at each lateral extremity. The mandibles tridentate, the outermost tooth longer but not broader than the two inner ones. The following maculations light lemon-yellow: mandibles except teeth and basal prominences, entire clypeus except narrow, hyaline, apical edge, the space between the clypeus and the inner orbits of the eyes to the level of the base of the antennae, a narrow line above each of the eyes (more extensive in the paratype from Venezuela, the stripes almost uniting), the scape except for a black line posteriorly, and a spot on the third joint of the antennae of the paratype. The fourth and fifth joints of the antennae are red in front in the paratype.

The mesonotum with dense, fine, almost granular punctation like that of the head; the mesopleura and scutellum with the punctures barely larger and almost as dense. The propodeum tessellate-punctate along its base and sides, merely tessellate in the apical half of the enclosure. The tegulae with small, dense punctures that are readily traceable on the reddish black to reddish middle, but are inconspicuous on the surrounding yellow. The tubercles erect and carinate along the top. The following maculations light lemon-yellow: an L-shaped figure bordering each side of the mesonotum, the shorter arm of the L extending about one-third of the distance across the anterior margin of the mesonotum, the longer arm along the side of the mesonotum to connect with the continuous band on the axillae and posterior rim of the scutellum, at the middle of which the band has a waistlike narrowing; the tubercles; the tegulae except for the center.

The legs have the following yellow maculations: a stripe on the apical half of the middle femora (and in the paratype also on the apical half of the front femora); the entire exterior surface of the front and middle tibiae; and the entire exterior surface of the hind tibiae except for a large, dark emargination anteriorly; the calcaria; all of the basitarsi (the remaining tarsal joints mostly reddish).

Wings hyaline; nervures deep brownish to blackish; a faint, longitudinal streak (due to the density of the microscopic hairs) occupying the upper half of the marginal cell, and a brownish stain briefly at the apex of the median cell. Venation that of *Anthidium*.

Tergite 1 of the abdomen with a medianly divided yellow band the halves of which are in turn narrowly subdivided (doubtless in some cases entire except for a posterior emargination); tergite 2 similarly four-spotted but with the interruptions so narrow that the least spread of the maculations would result in a complete band deeply but briefly emarginate on each side anteriorly, which is actually the case in the paratype; tergites 3–6 with rather wide, entire bands that have a waistlike contraction at the middle. In the type the bands on tergites 3–4 have at most a very gentle, scarcely noticeable, sinuous emargination above at each side, while the paratype has the band on tergite 3 emarginate deeply but briefly on each side anteriorly. Tergite 7 transparent rust-red except for cloudiness near the base (in the paratype the mainly red pygidium has faint yellow maculations on the lateral lobes and fragments of yellow maculations here and there at the base); the last visible sternite also rust-red; the tips of the sharp, straight, lateral spines on tergite 6 also red and transparent. In the

paratype the area below the yellow band on tergite 6 is likewise rust-red. The abdomen for the most part very finely punctured, the punctures being denser in the area below the yellow bands than in the area above the yellow bands on tergites 1–4, almost of equal density in these areas on tergite 5, and if anything rather denser basally than apically on tergite 6 (especially is this true of the type). A narrow edging along the apex of the rims of these tergites is impunctate. The punctures at the base of tergite 7 relatively coarse. The lateral lobes of tergite 7 extend only a little beyond the central spine, which is of evenly rounded contour above and slightly down-pointing, and are each much broader than the space that separates each of them from the central spine. They are not truncate along their lower edge but irregularly rounded to very obtusely angulate. The apical sternite has two intersecting carinae that form an irregular cross. At each of the lateral extremities of the transverse carina is an outward- to slightly down-pointing, strong tooth; a much smaller down-pointing tooth is at the apical extremity of the longitudinal carina, forming the tip of the broadly rounded apex of the last visible sternite.

The hair for the most part silvery to white, being silvery on the clypeus, the front, the cheeks, the dense lateral fringes on the scape, the sides of the thorax, the thorax beneath and abdomen beneath. The fringes posteriorly on the fore and middle tibiae and basitarsi and those anteriorly on the hind tibiae and basitarsi are almost white, and the matted, plumose hairs posteriorly along the apical half of the third tibiae are wholly so. Ochraceous to golden are the hairs fringing the apex of the clypeus, those on the vertex, and those on the under side of the tarsal joints, as well as those on the tergites. The hairs of the mesonotum only slightly ochraceous,—probably a variable condition depending somewhat on whether the specimen is a freshly emerged one or not.

Length, 11 mm.; width of thorax, 4 mm.; length of forewing, including tegula, 8¼ mm.

Female.—Similar to the male but with the following differences: mandibles multidentate as in other females of *Anthidium*, *s. str.* The apical margin of the clypeus slightly upthrust, and faintly emarginate along the middle, with two blunt, low teeth on each side of this central toothless area; this apical margin is black and shiny, not transparent. The clypeus not wholly maculated, but with a large triangle of black, dilated at the base, thrust downward toward the apex and, in the allotype at least, separating the yellow maculation into two large yellow spots. The scape of not so pure a yellow, tinctured with ferruginous and blackened briefly at its base and apex, and segments 4 and 5 of the antennae red below and to some extent also above.

The tegulae red, maculated with yellow only anteriorly.

Except for the partly black, partly red coxae (the anterior pair wholly black in the paratype), a black spot anteriorly near the apex of the hind tibiae, and black cloudiness here and there in the red areas, the legs are almost wholly ferruginous or rust-red variegated with yellow. The yellow areas include a stripe on the apical half of the under side of the front and middle femora, the entire external surface of the tibiæ except for a small, semitransparent, red spot at the apex of the fore and middle tibiæ and a more extensive area of red and black anteriorly on the apical two-thirds of the hind tibiae.

Two large, posteriorly not emarginate, cuneiform maculations on tergite 1, that are pointed toward each other and only very briefly separated. Two similar but a little more attenuated stripes on tergite 2 that are almost united at the middle into a

continuous band. Tergites 3–5 banded as in the male except that the median, waist-like narrowing is emphatic only on the band of tergite 3, and the bands are virtually entire laterally, not with a sinuous emargination above. Tergite 6 wholly yellow except for a small, faint, black spot on each side near the base and a darkened to reddish, brief, apical rim. A red spot occurs on each side of tergite 1 just above the yellow maculations and extends over to sternite 1. The venter otherwise rather dark. On each side of tergite 6 there is a sharp, conspicuous tooth.

The hair as described for the male except that instead of basitarsal fringes, all of the basitarsi of the female are covered concealingly with exceedingly dense, snow-white hair that is in sharp contrast with the reddish golden to fox-red tarsal brushes, and except that the fringes posteriorly on the front and middle tibiae are very much reduced.

Length, 8 mm.; width of thorax, 3¾ mm.; length of forewing, including tegula, 7½ mm.

The description of the male is based on a specimen (British Museum) that was donated by Dr. G. Salt. It was collected at Mamatoco, Santa Marta, Colombia, at an elevation of 500 feet, Feb. 18, 1927, by "M.A.C." It was taken in copula with the allotype (likewise in the British Museum). A female paratype (American Museum) was collected at Rio Frio, Magdalena, Colombia, on Feb. 1, 1927, by Dr. G. Salt. A male paratype (U. S. National Museum) was collected at C. Bolivar, Venezuela, on *Convolvulus*, by M. A. Carriker.

In some ways the Venezuelan specimen differs slightly from the specimens from Colombia but, in the absence of a series from Venezuela, it seems wiser not to give recognition to what may represent merely an individual variation. It is rather curious that, so far as I have been able to ascertain, there is only one other reference in the literature to a Venezuelan species, namely that described by Pérez (1892, Annales de la Société Entomologique de France, LXI, pp. 55–56) as *Anthidium Buyssoni*. The description suggests a *Hypanthidium* rather than an *Anthidium*, *s. str.*

Differences between *Anthidium sanguinicaudum* and *Anthidium hallinani* are discussed under the latter insect. Both of these species are characterized in both sexes by continuous bands on several of the abdominal tergites,—a form of maculation more often associated with *Heteranthidium* than it is with *Anthidium*.

Heteranthidium atoyacae, new species

FEMALE.—The head black with pale yellow maculations as follows: spot on each side of the clypeus, a supraclypeal triangle, lateral face marks (broad below, tapering above into a narrow rim along the inner orbits and terminating at the level of the anterior ocellus), and a brief line on the outer side of each eye near its summit. The mandibles black, short and rather thick, apparently toothless along their apical

margin, with two carinae near the outer margin, of which the inner carina is the stronger and more continuous; the mandibles somewhat rugose on the broad surface inward of these ridges. The clypeus rather coarsely punctured, somewhat shiny, its apical margin with a feeble tooth to each side of the very shallowly emarginate middle; the front and vertex much more delicately but very densely punctured, wholly opaque. The antennae very short, the flagellum only about twice as long as the scape; when the antennae are backward directed, their tip extends only just beyond the occiput. The hair silvery gray, rather evenly distributed, longest on the cheeks below.

The thorax black with the following cream-colored maculations: a line on each side of the anterior border of the mesonotum, a line along each of the lateral borders of the mesonotum extending to the axillae, a spot on each of the axillae and two more or less disintegrated spots posteriorly on the scutellum, a suboval maculation on each mesopleuron just below the tubercles, and a small spot anteriorly on the tegulae supplemented by a still smaller, dull red spot laterally. The thorax as densely punctured as the front, but the punctures larger and coarser on the mesonotum, scutellum, and mesopleura. The triangular enclosure of the propodeum covered with rather clear, strong punctures on a more or less tessellate surface, only the extreme apex of the enclosure being punctureless and exclusively tessellate. The sides of the propodeum beyond the enclosure with for the most part small, rather clear punctures on a more or less tessellate surface. The tubercles erect, sharply carinate above and shiny, their posterior aspect concave. The tegulae shiny, with for the most part clearly separated punctures. The hair silvery gray like that of the head, being longest on the pleura and sides of the propodeum.

The wings subhyaline, a little darker in the upper half of the marginal cell and in that portion of the apex beyond the cells. The venation fuscous except the costal vein, which inclines to ferruginous. The second transverse cubital vein completely interstitial with the second recurrent vein.

The legs are tricolored, with ferruginous and black predominant over yellow. Ferruginous are the following parts: forelegs with the trochanters narrowly at the apex, femora above especially toward the apex, anterior part of the tibiae; middle legs slightly toward the apex of the trochanters, femora entirely except for a basal spot of black below, tibiae entirely except for a narrow rim of black posteriorly on the external side, all the tarsal joints except for the darkened apical half of the claws; hind legs with the femora wholly except for a black streak anteriorly at the base, tibiae except for a black spot occupying the basal two-thirds of their external surface along the anterior half and a darkened basal area on the under side of the joint, the tibial spines, merely a narrow anterior rim on the basitarsi, and the remaining tarsal joints except for the darkened apical half of the claws. The other parts of the legs are black except that at the base of the tibiae of all of the legs there is a distinct, pale yellow maculation. The legs are robust, covered with silvery gray to whitish hairs that are rather long on the under side of the femora, especially in the case of the front pair, but short, rather appressed, and scalelike on the outer surface of all the tibiae. The basitarsi flattened, those of the hind pair of legs broad; the tarsal brushes pale gold. The pulvilli rather small.

The first five tergites of the abdomen relatively shiny even though they are fairly closely punctured, the punctures being very fine at the base but somewhat larger toward the apex of each tergite. The sixth tergite dull and granular, although finely

so. The abdomen black with uninterrupted, pale yellow bands on the first five tergites. These bands are rather abruptly broadened at their lateral extremities, but narrow and of an irregularly undulating character above over most of their extent, being very obtusely V-shaped at their middle. The band on tergite 5 is more uniformly broad than are the bands on tergites 1–4. There is a small spot placed at the middle of each lateral half of tergite 6. The hairs are pale and long on each side of the basal concavity of tergite 1, sparse and short but erect on tergites 2–5, while tergite 6 is rather densely covered, especially toward its apex, by short, appressed silvery hairs. The ventral scopa is silvery white.

Length, 9½ mm.; width of thorax, 3¾ mm.; length of forewing, including tegula, 8½ mm.

This species, which is described from a single specimen in the British Museum that was collected by Schumann at Atoyac, Vera Cruz, Mexico, is one of the smaller members of the genus *Heteranthidium*. In my key to the genus (1926, Amer. Museum Novitates, No. 218, pp. 2–4) it comes closest to *Heteranthidium crassipes* and *Heteranthidium fontemvitae*, both from Florida.

In size, *atoyacae* is comparable especially with *crassipes*. In both *atoyacae* and *crassipes* the mandibles are short. In *crassipes* the two teeth, one to each side of the middle of the apex of the clypeus, are much stronger than in *atoyacae*. In both these species the antennae are short but in *atoyacae* the terminal joint of the flagellum is only about one and one-fourth times as long as it is wide whereas in *crassipes* the proportions are nearly as two is to one. The punctation of *atoyacae* is much less coarse than is that of *crassipes*, the punctures of which are large and relatively sparse, with shining interspaces on mesonotum and abdominal tergites, whereas *atoyacae* is dull on the mesonotum and with a somewhat subdued sheen on the abdominal tergites. The facial and thoracic maculations of *atoyacae* are cream-colored and more restricted than are the deep yellow maculations of *crassipes*. The clypeus of *atoyacae* is bimaculate; that of *crassipes* largely yellow. On the mesonotum the stripes are interrupted at the anterolateral angles in *atoyacae* whereas in *crassipes* they are L-shaped. There are four widely separated maculations on the scutellum and axillae of *atoyacae*, in contrast to the broad, continuous maculation, briefly interrupted at the middle of the scutellum, that is present in this region in *crassipes*. The carinate tubercles are immaculate in *atoyacae*, maculated in *crassipes*. The anteriorly undulating bands on the tergites of *atoyacae* are replaced in *crassipes* by bands that are rather evenly emarginate above, suggesting a very gradual, uninterrupted curve that terminates somewhat before the broad lateral extremities of the bands. In both species tergite 6 is two-spotted. The

legs of *atoyacae* show a far greater predominance of red over yellow, only the bases of the tibiae being spotted with yellow, whereas in *crassipes* virtually the entire external surface of the front and middle tibiae, a large area on the hind tibiae, and a stripe on the under side of the front femora are yellow.

From *fontemvitae* the present species differs structurally in having short, broad mandibles with a rather straight apical edge, not long, greatly overlapping mandibles with a rather inslanting apical edge. The antennae are much shorter than those of *fontemvitae*, all of the segments except 1, 2, 3, and 12 being shorter than broad whereas in *fontemvitae* only segments 4, 5, and 6 are shorter than broad. The tubercles are sharply carinate above in *atoyacae*, less sharply so in *fontemvitae*; the depressed apical rims just beyond the bands on the tergites are narrow and, except at their extreme base, impunctate and shiny in *atoyacae* whereas in *fontemvitae* these rims are rather more developed and very densely and strongly punctured. Other differences, fundamental as well as superficial, could be added.

Dianthidium bertonii Schrottky

Dianthidium bertonii Schrottky, 1905, Anales Cientificos Paraguayos, (1), No. 4, pp. 6, 12; 1908, Anales de la Sociedad Cientifica Argentina, LXV, pp. 230–231.

Two specimens, a male and a female (U. S. National Museum) were collected by K. Fiebrig at San Bernardino, Paraguay, the female on Nov. 2, the male on Nov. 29, "on a thin green leafless stem of a labiate."

This species has the typical scalelike tegulae of the North American *Dianthidium* although lacking a coxal spine. Its second submarginal cell is slightly larger than the first and its second recurrent vein extends beyond the second transverse cubital by a distance only about half that by which the first recurrent vein extends beyond the first transverse cubital.

Dianthidium currani, new species

Male.—Very small and highly maculated species, black with rich yellow and ferruginous markings. The head has the following parts yellow: mandibles except the three black apical teeth, clypeus, inner orbits of the eyes (to the level of the anterior ocellus in the Barro Colorado specimens, confluent with the postorbital band in the specimens from Rio Frio), a continuous broad band encircling the back of the head from the base of one mandible, along the posterior orbit of the eye, across the vertex to the base of the other mandible, the supraclypeal area to above the level of the base of the antennal sockets (this maculation usually forks above in the case of the Barro Colorado specimens but is at most slightly emarginate above in the case of the Rio Frio specimens), a longitudinal yellow stripe below the middle ocellus (absent in

several of the Barro Colorado specimens), and a yellow stripe (sometimes indistinct) anteriorly on the scape, which is otherwise ferruginous as are the joints of the flagellum. The head densely punctured.

The yellow maculations of the thorax are as follows: a spot on each side of the pronotum, L-shaped maculations bordering the mesonotum, the longer arm of the L being along the side and confluent with the continuous yellow of the axillae and scutellum, tubercles, a curved stripe anteriorly or, more rarely, an encircling line on the otherwise ferruginous tegulae, virtually the entire mesopleura. The mesopleura and mesonotum with dense punctures, those at the very base of the black area between the short arms of the L-shaped figures being especially small and fine. The posterior face of the metathorax densely, uniformly, and microscopically tessellate and, in addition, with distinct punctures grouped fairly densely at the base and sides but absent from the middle region. The extreme base of the propodeum with a narrow row, medianly discontinuous, of shallow and rather indistinct pits.

The legs almost wholly yellow, variegated with ferruginous usually on the femora above, the tibiae within, and the tarsal joints beyond the basitarsi. In the Barro Colorado specimens the trochanters are conspicuously marked with black, and in addition there are sometimes one or two splashes of black at the base of the femora; in the specimens from Rio Frio these dark markings show only faintly or not at all. The pulvilli rather elongate, not so long, however, even in extreme cases, as the tarsal claws, which on their apical half are dark red to black.

The wings with the second recurrent vein extending a considerable distance beyond the second transverse cubital vein, about as far as the first recurrent vein extends beyond the first transverse cubital vein. The first and second transverse cubital veins convergent above, the first straight, the second with a slight sinuation, less marked than in the second recurrent vein. The marginal cell has a short appendix at its lower apical extremity. The wings somewhat deeper than hyaline and darkened in the marginal cell and in the veinless apical part adjacent to the marginal cell. The venation brownish but the stigma rather more inclined to dull ferruginous.

The abdomen less closely and more finely punctured than the head and thorax, with the larger punctures near the base of each tergite, the smaller ones near the apex, but the rims narrowly impunctate at the apex. The tergites reddish, with broad, uninterrupted bands across the upper half of tergites 1–3, still broader, uninterrupted bands on tergites 4–5, and with tergites 6–7 wholly yellow as is the venter. The concavity at the base of tergite 1 usually rimmed irregularly and discontinuously with black. At the middle of the apex of tergite 6 there is a prominence or tubercle that is slightly cylindrical viewed from above and truncate and subtriangular viewed from below. The seventh tergite has a wide, rather shallow, subrectangular emargination along its middle, resulting in two widely separated, strong, narrow, lateral spines.

The hair light, nowhere very dense or conspicuously long, rather evenly distributed over the head, thorax, legs, and abdomen, that on the clypeus, vertex, mesonotum, and inner surface of the basitarsi tending to golden, that on the under surfaces of the body silvery.

Length, 4½ to 5 mm.; length of forewing, about 5 mm.

FEMALE.—Little differentiated from the male in its maculations, sculpturing, and color and character of hair. The mandibles four-toothed instead of three-toothed and more extensively black at the apex. The yellow maculation in the supraclypeal

area sometimes more or less disintegrated but in one specimen at least even more replete than in the Barro Colorado males. The yellow bands on tergites 4–5 rather narrower than in the male, and tergite 6 usually more or less ferruginous apically instead of wholly yellow. The venter predominantly ferruginous and its scopa silvery. Tergite 6 without armature, resembling the preceding tergites. The pulvilli much less developed than in the male.

Length, 4½ to 5 mm.; length of forewing, about 5 mm.

It may be that *currani* is structurally close to if not identical with what Schrottky has described as *iheringi*. Nevertheless, in Schrottky's description no mention is made of the character, so conspicuous in the male of *currani*, that occurs on tergite 6, and the lateral spines on tergite 7 of *iheringi* are said to be tiny, not well developed as in *currani*. In fact, the description of *iheringi* in this respect as well as in its allusion to coarse punctation is more suggestive of Cockerell's *gualanense* than it is of *currani*. The specimens of *currani* are even smaller than *iheringi*, ranging from 4½ to 5 mm. as against 6½ mm. specified for *iheringi*. The maculations of *currani* do not entirely accord with those described for *iheringi*. The antennae are wholly ferruginous, with a yellow stripe on the scape, whereas those of *iheringi* are described as "rust brown at the base" with the implication that beyond the base the antennae are black. In *currani* virtually all of the mesopleuron is yellow, in *iheringi* only a small spot anteriorly. In *currani* both the axillae and scutellum are virtually all yellow, forming a continuous band with the L-shaped yellow borders of the mesonotum; in *iheringi* there are, instead, two maculations at the tip of the scutellum. In the specimens of *currani* before me there are lacking the median longitudinal stripes on the thorax indicated for *iheringi*. Finally *currani* has the yellow band on tergite 1 continuous, not interrupted as in *iheringi*.

In its maculations *Dianthidium currani*, male, is very like *Dianthidium gregarium* subspecies *colombiae*, male, which likewise occurs at Rio Frio, Colombia. The black apical joint of the flagellum of *D. gregarium* subspecies *colombiae* and the presence of black on many of the other joints serve to differentiate this insect from *currani*, while the absence of yellow from the mesopleura of *colombiae*, male, if constant, is an even more striking superficial difference. The notably longer, black-tipped, lateral spines on tergite 7 of *gregarium* subspecies *colombiae* best differentiate it, however, from *currani* with its much shorter and wholly yellow spines. There is also a strong superficial resemblance between both sexes of *currani* and *Hypanthidium panamense*.

One of the males from Barro Colorado Island, Canal Zone, collected by C. H. Curran, Dec. 23, 1928, has been designated the type. This

specimen and thirteen male paratypes from the same locality, collected by C. H. Curran, E. I. Huntington, and H. F. Schwarz, are in the American Museum. The specimens collected by Huntington and Schwarz were obtained March 22–24, 1933. Two male paratypes from Rio Frio, Colombia, collected Jan. 1, 1927, by G. Salt, are in the British Museum, the third paratype from that locality is in the American Museum. The allotype, collected by H. F. Schwarz, March 23, 1933, at Barro Colorado Island, and four female paratypes from the same locality, collected by E. I. Huntington and H. F. Schwarz, March 22–24, 1933, are in the American Museum.

Dianthidium gregarium (Schrottky)

Hypanthidium gregarium SCHROTTKY, 1905, Anales Cientificos Paraguayos, (1), No. 4, pp. 8–10, 12.

Anthidium gregarium, FRIESE, 1908, 'Die Apidae (Blumenwespen) von Argentina,' pp. 69–70. STRAND, 1910, Zool. Jahrb. Syst. Geogr. und Biol., XXIX, p. 548.

Dianthidium gregarium, COCKERELL, 1912, Psyche, No. 2, p. 45; 1914, Proc. U. S. Nat. Mus., XLVII, p. 93.

A female (U. S. National Museum) collected by W. T. Foster, Sapucay, Paraguay, in February. It differs from Schrottky's description of the typical form only in that the mandible is quadridentate, the two inner teeth (possibly concealed in Schrottky's specimen) being the smaller ones, and in that the femora (especially those of the hind pair of legs) are more or less black.

A male specimen (American Museum) from Villa Rica, Paraguay, 1900.

Dianthidium gregarium colombiae, new species

MALE.—Differs from the typical subspecies in the greater prevalence of ferruginous and yellow and the corresponding subordination of black. The area between the yellow antennal carinae is red, not black. There is a ferruginous patch, too, on each side of the pronotum. Except for a little black on the coxae and except for the reddish black apical half of the tarsal claws, all of the joints of the leg are ferruginous variegated with yellow, the yellow being most conspicuous on the front and hind coxae, on the femora beneath, on the external surface of the tibiae (especially the front and middle pair) and on the external surface of the basitarsi and adjacent tarsal joint. Not merely the apical rims but the bases (for the most part) of the tergites are ferruginous—indeed the only evidence of black on the abdomen, either dorsally or ventrally, is the dark basal concavity on segment 1, the basal region of tergite 2, and the black tips of the two long, yellow, lateral spines on tergite 7. The yellow bands on the tergites are exceedingly broad and uninterrupted, occupying most of the exposed surface. On tergites 1–2 the bands are somewhat suffused with ferruginous along their middle; those on the subsequent tergites are clear yellow and of increasing breadth.

FEMALE.—What I believe to be the associated female of the above-described male is structurally like the male in having small carinae converging below between the antennae, down-sloping tubercles that are rather flattened above although not scalelike as in typical *Dianthidium*, a medianly discontinuous row of narrow and inconspicuous pits at the base of the propodeum, a rather short and apically broad scutellum emarginate medianly, and forewings of identical venation to those of the male and with their upper margin notably darker than the rest of the wing.

The female is even more extensively maculated than the male, and shows a greater inclination to reddish suffusion of the yellow maculations, particularly in the case of the head and abdomen. The paratype is especially reddened but at least part of this intensification of its coloration may be due to cyanide staining. The black area on the head, viewed from in front, has shrunk in the case of the allotype to a broad horseshoe-shaped figure that rings the ocelli; from the outer edge of each of the down-pointing arms of the horseshoe a narrow streak of black descends to the base of the antennae. In the even more completely maculated paratype only the vestiges of this black figure remain. The full maculation of the cheeks corresponds with the condition in the female of subspecies *minor* (in typical *gregarium* and in the subspecies *clypeata* the maculation on the cheeks terminates midway down the posterior margin of the eyes). The band along the inner margin of the eye is, as in typical *gregarium*, confluent with the band along the vertex, not terminated, as in subspecies *continuifasciatum*, a little above the base of the antennae. The clypeus of *colombiae* is wholly maculated, not black as in the typical subspecies, nor with a transverse ferruginous line in the middle as in subspecies *clypeata* and *minor*. There is a small, subdued red maculation at the top of the mesopleura just below the tubercles. The legs have more black on the coxae and trochanters than is the case in the associated male and the yellow areas on the femora and tibiae are not sharply differentiated from the ferruginous, being indistinguishable in the paratype. The abdomen in both the female allotype and the female paratype is without a trace of black. In contrast to typical *gregarium* and its other subspecies, the female of the present subspecies has like the male broad, uninterrupted, bands on all of its tergites, but in the specimens on which this description is based these bands are red (probably due to cyanide staining) and do not present a particularly strong contrast to the light brown apical rims.

In the absence or virtual absence of black on the abdomen the subspecies *colombiae* differs not only from typical *gregarium* but also from the related *heathi* described by Cockerell and from *longipes* Friese.

In its ornamentation *colombiae* is much like *Hypanthidium panamense*. Its mesopleura, however, in contrast to the largely yellow mesopleura of *panamense*, are wholly black or with only a much reduced maculation, and the band along the inner margin of the eyes is confluent with that encircling the head; the antennae of the male differ from the ferruginous antennae of *panamense*, not only by their crenulate structure and length, but the presence of black maculations approximately as described by Schrottky in the case of the typical subspecies of *gregarium*. A rather close superficial resemblance obtains, also, between *colombiae* and *currani* as indicated in the discussion of the latter.

What Friese (1925) described as *Anthidium longipes* would seem to be close structurally to *gregarium*. Friese mentions a small tooth in the emargination between the two long lateral teeth of the seventh tergite. Of this there is only the barest trace—so feeble that it scarcely deserves mention—in the specimens of *gregarium* before me, and sternites 4 and 5 of *gregarium*, not 2–4, as indicated for *longipes*, have a small lobelike extension at each of their lateral extremities. However, these prolongations on the sternites of *gregarium* are less developed than are the lobelike to spinelike lateral extremities on its tergites. Of such formations on the tergites of *longipes* there is no mention in the description of *longipes*.

The type and allotype of subspecies *colombiae* are in the British Museum. The type was collected by Dr. G. Salt at Rio Frio, Magdalena, Colombia, on Nov. 29, 1926; the allotype and paratype are from the same locality but were collected respectively on July 13 and July 17, 1927. The paratype is in the American Museum.

A good deal of diversity of opinion has been expressed regarding the genus to which *gregarium* should be assigned. Schrottky in describing it placed it in *Hypanthidium*. The possession of a pulvillus would seem, however, to bar it from *Hypanthidium* as well as from *Anthidium*, in which Strand placed it. Cockerell referred both *gregarium* and *heathi* to "an aberrant section of *Dianthidium*." The specimens before me lack the scalelike tubercles that are present in typical *Dianthidium* and the equally characteristic spine on the third coxae is either merely in a formative stage or obsolescent, being barely traceable. Cockerell (1927, Proc. U. S. Nat. Mus., LXXI, Art. 12, p. 3) placed *arenarium*, a close relative of *gregarium*, and possibly an even closer relative of *heathi*, in the subgenus *Anthodioctes*. Cockerell's *heathi*, like part of the type material of Ducke's *arenarium*, was collected in Parahyba. My impression is that these insects—*gregarium*, *arenarium*, *currani*, *subarenarium*, and probably *heathi* and *longipes*—represent a division in *Dianthidium* that leans toward *Hypanthidium*.

The following key to the males of *currani*, *gregarium* subsp. *colombiae*, *arenarium*, and *subarenarium* may be of aid in differentiating these rather closely related species:

1.—The two lateral spines that terminate the seventh tergite wholly yellow and ferruginous, and relatively short, each about half as long as the distance that separates the base of the one from the base of the other. The sixth tergite with a tuberculate prominence at the middle of its apical edge. The antennae relatively short, not extending beyond the tegulae..... *currani*.

The two lateral spines that terminate the seventh tergite black-tipped and relatively long, each about two-thirds as long as the distance that separates the base of the one from the base of the other. The sixth tergite without a tuberculate prominence at the middle of its apical edge. The antennae very long, all of the joints being much longer than broad. When extended backward, the antennae reach about to the apex of the scutellum.....2.

2.—The third sternite with two rather narrowly separated reddish spines at the middle of its apex. No fringelike or comblike arrangement of the hairs along the base of this sternite, but numerous short hairs (much longer at the sides) over its surface.....*subarenarium.*

The third sternite without spines but with two scalelike lobes separated by a cleft. This sternite is largely hairless over its exposed surface but has a tuft of hairs protruding from beneath on each side of the median cleft, and its base has a single row of rather stiff hairs that are graded in size, being small at the middle but long and tuftlike at the lateral extremities.....3.

3.—The antennae beyond joint 4 crenulate below. The basal fringe on sternite 3, conspicuous and ferruginous. Sternite 4 has at its middle a small bladelike triangular process that is usually concealed, however, because the two apical tergites tend to fold back upon the venter...*gregarium* subsp. *colombiae.*

The antennae normal. The basal fringe on sternite 3 relatively inconspicuous and pale. Sternite 4 with two small, rather bulbous, dark brown stalks at the center, each of which terminates in a small, four-toothed comb. At each of the lateral extremities of sternite 4 there is a large, inpointing finger-like spine. Sternite 4 is usually concealed, however, because the two terminal tergites tend to fold back under the venter.....*arenarium.*

Dianthidium subarenarium, new species

MALE.—The head dull, very densely, deeply and rather uniformly punctured. The mandibles tridentate, the outermost tooth the largest. The clypeus broader than long. The region between the antennae raised, flanked on each side by a carina; these carinae converging below. The antennae simple, not crenulate below, all of the joints longer than broad, the basal joints of the flagellum being the least elongated. The following maculations are yellow: mandibles except the teeth and the outer half of the base, clypeus except a narrow area along the base and sides, the interantennal carinae faintly, the inner orbits of the eye taperingly to about the level of the anterior ocellus, a line back of the ocelli extending from a little beyond the summit of one eye to a little beyond the summit of the other. The scape ferruginous and the three or four subsequent joints largely or wholly ferruginous, those beyond dark at least above and somewhat invaded by blackish also below, the two or three apical joints dark both below and above.

The mesonotum with punctation much like that of the head. The pleura with somewhat larger, less dull punctures. The scutellum rather short and apically broad, slightly emarginate at the middle posteriorly. The propodeum basally with a row, medianly discontinuous, of narrow and inconspicuous pits. The tubercles downsloping, rather coarsely punctured, with their anterior end slightly carinate. The red tegulae rather densely covered with small but rather deep punctures. L-shaped borders of yellow on the mesonotum, the longer arm of the L being along the side, and a narrow band posteriorly on the axillae and scutellum.

The forelegs ferruginous except for the black coxae and trochanters and a darkened area on the femora above. The middle legs rather more extensively black on the femora, otherwise like the fore legs. The hind legs have the following parts ferruginous: a spot on the coxae, the apex of the femora, the tibiae except for an extensive dark area on the outer surface, the calcaria, the basitarsi and the next succeeding tarsal joint, and the basal half of the claws. The apical half of the claws of all of the legs is dark.

The wings subhyaline but the forewing distinctly darker anteriorly, particularly so in the marginal cell. The venation fuscous. The marginal cell with a small appendix or thickening at the lower extremity of its apex. The second recurrent vein extends well beyond the second transverse cubital vein but not quite so far as the first recurrent vein extends beyond the first transverse cubital vein. The two submarginal cells subequal in size. The two transverse cubital veins converging above, the second transverse cubital rather sinuous but not quite so sinuous as the second recurrent vein.

The tergites of the abdomen very densely covered with small, deep punctures. The punctures are a little larger at the base of each tergite than at the apex, but there is a very narrow apical rim on tergites 2–5 that is impunctate and slightly reflexed. These rims semitransparent and brownish ferruginous. The punctured part of the tergites rather dull. Tergites 1–2 dull reddish basally, blackish apically, with a rather diffuse yellowish maculation at the lateral extremities of each, the maculations on tergite 2 being smaller than those on tergite 1. Tergites 3–6 blackish, with continuous bands of dull yellow that are heavier from tergite to tergite, but even on tergite 6 occupy only about half the tergite. Tergite 7 briefly black basally, yellow beyond to the inclusion of its two long lateral spines only the apical tips of which are darkened. The sternites with a tendency to be dark basally, dull yellowish or ferruginous apically, but without strong contrast. Sternite 3 has two small, narrowly separated teeth at the middle of its apex. Sternites 4 and 5 with a spinelike termination at each lateral extremity. Of the tergites only tergite 7 is armed.

The hair for the most part pale (a little yellowish on the front and vertex), longest perhaps at the sides of sternite 2 but not conspicuously long even there.

Length, 6 mm.; length of forewing, including tegula, 6 mm.

The description is based on a single specimen (British Museum) from Brazil, the ink on the label being so faded through age that the specific locality is indecipherable. Tergite 7 is folded under the abdomen, concealing the apical sternites. Due to the age and condition of the specimen I have thought it inadvisable to try to relax it and reveal the concealed parts. The presence of the teeth or spines at the middle of the apex of sternite 3, however, separates this species from the rather closely related *arenarium*, *heathi*,[1] *gregarium* subspecies *colombiae*, and

[1]Professor Cockerell very kindly supplied me with a diagram of sternite 3 of *heathi*. The sternite in question has a median longitudinal groove or cleft suggestive of the condition in *arenarium* and *gregarium* subspecies *colombiae*, and the diagram shows a hairy tuft, too, at each side of the base of this sternite. This sternite of *heathi* lacks the spines at the middle of the apex that are present on sternite 3 of *subarenarium*. Professor Cockerell states in his comments accompanying the diagram: "The type of *heathi* has 2 black spots or small tubercles on sternite 3, as shown (the diagram indicates as the position of these spots not the apex but the central region of the sternite, each spot a little to one side of the median longitudinal groove or cleft). I had to see them end on, as it were, and they might look more specklike in another view, but I should call them small tubercles." The specimens of *subarenarium*, *arenarium*, and *gregarium* subspecies *colombiae* before me do not seem to share this character.

presumably also from *longipes* as this character is not mentioned in the description of *longipes*. From *gregarium* and *longipes* it differs furthermore in having the flagellum simple, not crenulate below. See key in connection with *gregarium* subspecies *colombiae* (pp. 18-19).

Dianthidium (Anthodioctes) megachiloides (Holmberg)

One female (National Museum) collected at S. Bernardino, Paraguay, Nov. 2, flying in forest (K. Fiebrig).

Dianthidium (Anthodioctes) nectarinoides (Schrottky)

One female and one male (National Museum) from Campinas, São Paulo, Brazil, Jan. 30, 1901.

Dianthidium (Anthodioctes) agnatum (Cresson) and
Dianthidium (Anthodioctes) calcaratum (Friese)

Friese's *calcaratum*, described doubtfully as a *Stelis* (1921, Stettiner Entomologische Zeitung, LXXXII, p. 96) is structurally virtually identical and in its maculations much like Cresson's *agnatum*, also in my estimation an *Anthodioctes*. Both are characterized by exceedingly large and deep punctures on the head, on the thorax, and on the sides of the abdominal tergites. Along the middle of the abdominal tergites the punctures are much finer, particularly so in the case of *calcaratum*. Both insects have along the base of the propodeum an uninterrupted row of deep, conspicuous, subrectangular pits horizontally placed, and tergite 7 in the males of both is exceedingly short and virtually undifferentiated from tergite 6 except as to size. In respect to tergite 7 both resemble the male of *salti* and presumably also of certain other *Anthodioctes* listed in connection with *salti* (see p. 25). The wings of *agnatum* and *calcaratum* are slightly fuliginous, with the costal margin of the forewings a little darker. The males differ in their maculations as follows:

Clypeus entirely yellow. A dot on each side of tergite 1 and sometimes a maculation on each side of tergite 2 as well..... *agnatum.*

Clypeus black with its anterior margin rather broadly banded with yellow, the band sometimes interrupted in the middle. Tergites 1–2 immaculate.... *calcaratum.*

There is in the American Museum a series, both males and females, of *calcaratum* from San José, Costa Rica, including a specimen of Friese's type material. Cresson's *agnatum*, the type of which I have examined, is from Mexico. A male specimen (British Museum) from Atoyac, Vera Cruz, collected by Schumann, is in my estimation to be considered an

agnatum, although it has maculations on each side of tergite 2 (not specified by Cresson) as well as on each side of tergite 1.

Dianthidium (Anthodioctes) zebratum (Schrottky)

Dianthidium zebratum SCHROTTKY, 1905, Anales Cientificos Paraguayos, (1), No. 4, pp. 7–8, 12; 1908, Anales de la Sociedad Cientifica Argentina, LXV, p. 230. COCKERELL, 1914, Proc. U. S. Nat. Mus., XLVII, p. 93.

Dianthidium itapuense SCHROTTKY, 1920, Revista do Museu Paulista, XII, part 2, pp. 210–211.

Several females from Argentina and Paraguay must be referred, I think, to this species, although the abdominal maculations differ somewhat from those of Schrottky's description and the specimens differ, too, among themselves. In all of them there are merely two widely separated lateral spots on tergite 1, and the narrow bands on tergites 2–3 are without interruption medianly (in Schrottky's specimens "all the bands except the first lightly interrupted in the middle"). In the case of tergites 4–5 the specimen from Posadas in Misiones (from which Schrottky's female was described) has the narrow bands very slightly interrupted medianly; in a specimen from Bompland, also in Misiones, the bands on these tergites are uninterrupted medianly. In the Paraguay specimens, on the other hand, the interruption of the bands on tergites 4–5 is a wide one, and these tergites would better be described as quadrimaculate, with the inner maculations much the larger.

If I have interpreted Schrottky's species correctly, it belongs in the subgenus *Anthodioctes*. The females before me have the base of the propodeum with a row of large, deep pits as in *salti*, which is also the condition in what I have interpreted as *megachiloides*, the type species of *Anthodioctes*. The proportions of the labial palpi seem in both *salti* and *zebratum* as here interpreted to approach those indicated for *megachiloides*. The description of the male pygidium of *zebratum*, in which mention is made of a "small tooth on each side," is suggestive of the condition in *gualanense*.

Schrottky (1920, Revista do Museu Paulista, XII, part 2, pp. 210–211) changed the name of this species, which he originally designated *zebratum*, to *itapuense* because Cresson had described a *zebratum* from North America. Cresson's species is, however, a *Heteranthidium*, not a *Dianthidium*, and, if one is prepared to recognize generic distinctions within the Anthidiinae, *zebratum* would still be a valid name for Schrottky's insect.

The female specimens (British Museum, National Museum, and

American Museum) here discussed are from the following localities: Bompland, Misiones Territory, Argentina, Jan. 13–14, 1927 (F. and M. Edwards); Posadas, Misiones Territory, Argentina, Jan. 14–15, 1927 (F. and M. Edwards); S. Bernardina, Paraguay, Dec. 27–29 (K. Fiebrig).

Dianthidium (Anthodioctes) salti, new species

MALE.—Head black with a yellow maculation occupying the apical half of the clypeus exclusive of the narrow apical edge; a small and narrow triangular maculation (little more than a stripe) on each side of the face, terminated above at the level of the base of the antennae, and a thin, very fragmentary band across the vertex from a level a little beyond the summit of one eye to a level a little beyond the summit of the other. The punctures are rather small and dull in the supraclypeal area and between the low, inconspicuous, interantennal ridges, which are widely separated and converge below; the punctures are larger and coarser on the clypeus and on the front, and very large on the cheeks; those in the supraclypeal area and on the front bear evidence here and there of tessellation; those on the cheeks are shiny. The posterior rim of the cheeks is raised keel-like and there is a carina, too, flanking the innermost row of punctures on the cheek. The mandibles tridentate, with the outermost tooth much more conspicuous than the two succeeding ones. The apical edge of the clypeus with a pair of minute denticles on each side of the center, the inner teeth of each pair being somewhat more developed than the outer teeth. All of the joints of the antennae black above as well as below except the third joint, which is largely red; the joints from the fourth on about one and one-quarter to one and one-half times as long as broad.

The thorax black, immaculate except for a small yellow spot on each of the axillae. The punctation of the thorax large, distinct, and dense like that of the front and with superimposed tessellation traceable, especially in the punctures of the mesonotum. The suture between the mesonotum and scutellum deep and impunctate, shiny, and the scutellum itself rather short and entire, not emarginate at the middle of its posterior rim. The base of the propodeum with a row of subrectangular spaces or pits of subequal size formed by a number of short, longitudinal, more or less parallel carinae. These subrectangular spaces are dull with a dense, uniform, microscopic tessellation, which extends over the entire propodeum to the inclusion of the rather ill-defined and in its sculpturing undifferentiated enclosure. The tubercles black, shiny, down-slanting and with an erect, low, sharp carina on their anterior edge. The tegulae black, finely punctate.

The legs wholly black except for the apical joint of the tarsi, which is slightly tinged with reddish. The calcaria black.

The wings with a little fuscous staining and a streak of that hue in the apical half of the marginal cell, which has a minute appendix at its tip. The first submarginal cell barely larger than the second. The second recurrent vein extends a considerable distance beyond the second transverse cubital, almost exactly the same distance by which the first recurrent vein extends beyond the first transverse cubital. The first and second transverse cubital veins convergent above, the first straight, the second with a slight sinuation, less sinuous than is the second recurrent vein. The venation dark brown; the stigma rather light brown.

The punctures of the tergites of the abdomen dense (especially in the case of the

two basal ones) but much finer and smaller than the punctures on the head and thorax, being distinctly dainty in contrast. The punctation extends to the apical rims of the tergites, only the extreme edge of tergites 4 and 5 being uninvaded by punctures. A carina encircling the basal concavity of the abdomen. Tergite 1 and 2 are immaculate. Tergites 3–5 have a broad, rich yellow, uninterrupted band, so broad that when the abdomen is retracted only the apical rims show dark; tergites 6–7 are almost exclusively yellow. The apical tergite is short, entire, with very much the appearance of the sixth tergite except that it is much smaller.

The hair of this insect is for the most part black or fuscous. The hairs are predominantly dark on the head and on the mesonotum and mesopleura, and, though not dense, are relatively long, especially on the front, vertex, mesonotum, and scutellum. On the under side of the coxae, trochanters, and even the femora the hairs incline to gray, but the prevailing color of the hairs of the legs is black, even the hair on the under side of the tarsi being dark. The hair on the abdominal tergites is scant, short, and for the most part pale. The basal part of the venter relatively glabrous but the median and apical sternites covered rather densely with silvery, rather plumose hairs.

Length, 5¼ mm.; width of thorax, 2 mm.; length of forewing, including tegula, 5¼ mm.

FEMALE.—The female rather similar in appearance to the male. The mandibles with two strong teeth at the outer half of the apex and with at most a slight undulation on the inner half that suggests two additional obsolescent teeth, but even these raint vestiges sometimes absent. The denticles on the margin of the clypeus (two on each side of the middle) of about equal size. The sculpturing and punctation about as in the male, but an irregular, longitudinal carina traceable in some of the specimens in the supraclypeal area and extending down the basal half of the clypeus. The inner orbits of the eyes bounded by a thin stripe of yellow to about the level of the base of the antennae and a similar very narrow band along the vertex posteriorly, usually not or only slightly interrupted. The clypeus devoid of maculations except in one specimen, in which a small spot is traceable on each side. The joints near the base of the flagellum somewhat broader than long; those nearer the apex subequal in breadth and length; the apical joint longer than broad. The fourth joint of the antennae and sometimes the apex of the first joint reddish, the other joints black both above and below.

The thorax, legs, and wings as described for the male.

The abdomen with a dull, somewhat diffuse, broad, basal, orange to reddish band on tergite 1 and a dull orange to reddish band of variable thickness (sometimes nearly extinguished) on tergite 2. These bands in their dull, lusterless quality contrast with the more sharply outlined, yellow bands on tergites 3–5 and the largely to wholly yellow tergite 6. The band on tergite 3 is thinner than that of the subsequent tergites. The sternites are wholly yellowish red.

The hairs even more prevailingly dark than in the male, almost exclusively black except for the copper-colored hairs fringing the apex of the clypeus and the silvery ventral scopa.

Length, about 7 mm.; width of thorax, 2½ to 2¾ mm.; length of forewing, including tegula, 7 to 7¼ mm.

The specimens were all collected at Vista Nieve, Santa Marta, Colombia, elevation 5000 feet. The holotype was collected by G. Salt

on Feb. 10, 1927; the allotype and paratypes by "M. A. C." on Dec. 19, 1922, Oct. 29, 1923, and Feb. 18, 1927. The holotype, allotype, and three of the paratypes are in the British Museum; a fourth paratype is in the American Museum.

In its virtually immaculate thorax and its wholly immaculate legs, contrasted with a rather fully maculated abdomen, and in the predominance furthermore of black hairs over most of the body contrasted with the silvery scopa of the venter, *Dianthidium salti* has a combination of superficial characters that make its differentiation from most Neotropical Anthidiinae rather easy.

In Cockerell's "Key to Species Belonging to, or Resembling, *Anthodioctes*" (1927, Proc. U. S. Nat. Mus., LXXI, Art. 12) *salti* runs close to *megachiloides* Holmberg. The description of the male of *megachiloides* does not indicate the structure of tergite 7, which may mean that, like tergite 7 of *salti*, it is undifferentiated from the preceding segments. In Holmberg's insect the hairs are prevailingly pale (black in *salti*), the calcaria testaceous-ferruginous (black in *salti*), the wings fulvous at their base (fuscous in *salti*), tergites 1–2 black (with dull red bands in at least the female of *salti*), etc.

It would seem, judging from the description, that tergite 7 of the males of the following species is possibly like that of tergite 7 of the male of *salti*.

duckei (Segment 7[1] "merely rounded, without armature")
radiale (Segment 7 "small, simple")
callorhinum ("apex broadly rounded")
chrysurum ("apex broadly rounded, slightly truncate")
mapirense ("apex broadly rounded, without teeth")

From all of these species *salti* differs in having prevailingly black hair, the other species just mentioned having respectively "scarcely a remnant of brown hair," "gray-yellow," "extremely scanty," "long rufous," and "scanty whitish hair."

From *duckei* it differs, in addition, in having the mesonotum and scutellum unmaculated, the calcaria black, not red; from *radiale*, in not having wings that are basally ferruginous; from *callorhinum* and *chrysurum* in having the mesonotum and scutellum unmaculated.

Anthidium pygmaeum Friese and **Dianthidium gualanense** Cockerell

I have seen the type of neither *pygmaeum*, described by Friese, in 1910, from Para, Brazil, on the basis of the female, nor the type of

[1]The statement is "segment 1" but I think almost certainly it should read "segment 7."

gualanense, described by Cockerell, in 1912, from Guatemala on the basis of the male. It would seem, however, that structurally these two insects are very similar. Notwithstanding their diminutive size (each insect is 5 mm. in length), they are characterized by very large coarse punctures, and at the base of their metathorax are strong grooves with prominent ridges separating them. In each insect the strongly punctured abdomen has a spot on each side of tergites 1–2 and bands on the subsequent tergites except that in *pygmaeum* tergite 6 is immaculate (possibly a variable character). It is in the thoracic markings that the most tangible differences in the descriptions of the two insects occur, the thorax of *gualanense* being "wholly without light markings" but that of *pygmaeum* extensively maculated.

A male (British Museum) from R. Papagaio, State of Guerrero, Mexico, collected by H. H. Smith at an elevation of 1200 feet, conforms structurally and in its maculations to *gualanense* as described by Cockerell except that it lacks the following maculations: spot on mandibles, occipital band, and lateral patches on first two tergites. A female (British Museum) taken by the same collector in October at Tierra Colorada, State of Guerrero, at an elevation of 2000 feet, presents the undermaculated condition that characterizes the male from the same state.

In contrast to these two specimens there is yet another male (British Museum) collected at Atoyac, Vera Cruz, by Schumann, that in its maculations is suggestive of the female described by Friese as *pygmaeum*. If one excepts what are presumably sexual differences, namely, the fully maculated clypeus of this male and the presence of a narrow band on tergite 6 similar to that on tergites 3–5, then the only part in the description of *pygmaeum* that does not apply to the Atoyac specimen is the coloration of the legs, both the middle and hind legs of the Atoyac specimen being dark with a pale yellow stripe beneath on the apical half of the middle femora.

I have discussed *iheringi* in connection with *currani*, but structurally *iheringi* may be closer to *gualanense*. Certainly the description of the punctation of *iheringi* as "everywhere dense and coarse" and of its tergite 7 as "blunt and with a tiny tooth on each side" would apply with equal accuracy to the male of *gualanense*. It may be, therefore, that we have here three structurally identical or nearly identical forms: namely, a highly maculated form (*iheringi*), an intermediate form (*pygmaeum*), and an undermaculated form (*gualanense*). The fact that two of them, *iheringi* and *gualanense*, have been described as *Dianthidium* and the third, *pygmaeum*, as an *Anthidium* is of no significance due to the

divergent interpretations of different authors regarding the generic and subgeneric divisions within the Anthidiinæ. The specimens before me seem to ally themselves with the subgenus *Anthodioctes*.